

Notice of Allowability

Application No.

09/938,453

Examiner

Phuong Phu

Applicant(s)

HUANG ET AL.

Art Unit

2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Response filed on 5/11/07.
2. ☒ The allowed claim(s) is/are 1-3, 7-21 and 23-42.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date 6/14/07
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

1. This Office Action is responsive to the Response filed on 5/11/07. Accordingly, claims 1-3, 7-21 and 23-42 are currently pending; and claims 4-6 and 22 are canceled.

REASONS FOR ALLOWANCE

2. Claims 1-3, 7-21 and 23-42 are allowed.
3. The following is an examiner's statement of reasons for allowance:

-Regarding to independent claim 1, none of prior art of record teaches or suggests a method for compensating for time dispersion in a receiver of a wireless system that has a plurality of transmit antennas and a plurality of receive antennas, as claimed. Jalali et al (7,027, 523), previously cited, teaches the claimed method except he at least fails to teach that the method comprise a procedure of determining a joint equalizer solution using channel information for at least one pairing of at least one of said transmit antennas and said receive antennas and said received samples of at least two of said receive antennas, with reasons stated in REMARKS, pages 3-4, of the Response filed on 5/11/07, wherein, in light of the specification of the instant application, page 1, lines 25-32 and page 5, lines 14-21, the joint equalizer solution is defined that the joint equalizer solution compensates not only for the impact of the channel on all of possible transmit antenna-receive antenna pairings of the plurality of transmit antennas and plurality of receive antennas, but also for the interference of the other transmit antennas on any given receive antenna wherein the joint equalizer solution provides M, i.e., the number of transmit antennas, streams of correct symbols, or in the case of the CDMA, streams of corrected chips which when properly combined form symbols. It would not have been obvious for one

Art Unit: 2611

skilled in the art to implement Jalali et al in view of other prior art of record for leading such the implementation to the claimed invention.

-Regarding to independent claim 8, none of prior art of record teaches or suggests a method for compensating for time dispersion in a receiver of a wireless system that has a plurality of transmit antennas and a plurality of receive antennas, as claimed. Jalali et al teaches the claimed method except he at least fails to teach that the method comprise a procedure of determining a joint equalization solution using channel information for at least one pairing of at least one of said transmit antennas and said receive antennas and said received samples of at least two of said receive antennas, with reasons stated in REMARKS, pages 3-4, of the Response filed on 5/11/07, wherein, in light of the specification of the instant application, page 1, lines 25-32 and page 5, lines 14-21, the joint equalizer solution is defined that the joint equalizer solution compensates not only for the impact of the channel on all of possible transmit antenna-receive antenna pairings of the plurality of transmit antennas and plurality of receive antennas, but also for the interference of the other transmit antennas on any given receive antenna wherein the joint equalizer solution provides M , i.e., the number of transmit antennas, streams of correct symbols, or in the case of the CDMA, streams of corrected chips which when properly combined form symbols. It would not have been obvious for one skilled in the art to implement Jalali et al in view of other prior art of record for leading such the implementation to the claimed invention.

-Regarding to independent claim 18, none of prior art of record teaches a receiver for use in a multiple-input multiple-output (MIMO) system in which a plurality of signal detectors receive signals transmitted by a plurality of signal sources, as claimed. Jalali et al teaches the claimed receiver except he at least fails to teach the receiver comprising a joint equalizer that

Art Unit: 2611

develops a joint equalizer solution using channel information for at least one pairing of at least one of said signal sources and said signal detectors and received samples of at least two of said signal detectors and supplies as an output a signal that includes at least said joint equalizer solution applied to a signal received by at least one of said signal detectors, with reasons stated in REMARKS, pages 3-4, of the Response filed on 5/11/07, wherein, in light of the specification of the instant application, page 1, lines 25-32 and page 5, lines 14-21, the joint equalizer solution is defined that the joint equalizer solution compensates not only for the impact of the channel on all of possible transmit antenna-receive antenna pairings of a plurality of transmit antennas associated with the plurality of signal sources and a plurality of receive antennas associated with the plurality of signal detectors, but also for the interference of the other transmit antennas on any given receive antenna wherein the joint equalizer solution provides M, i.e., the number of transmit antennas, streams of correct symbols, or in the case of the CDMA, streams of corrected chips which when properly combined form symbols. It would not have been obvious for one skilled in the art to implement Jalali et al in view of other prior art of record for leading such the implementation to the claimed invention.

-Regarding to independent claim 30, none of prior art of record teaches a receiver for use in a multiple-input multiple-output (MIMO) system in which a plurality of signal detectors receive signals transmitted by a plurality of signal sources, as claimed. Jalali et al teaches the claimed receiver except he at least fails to teach the receiver comprising a joint equalizer that develops a joint equalizer solution using channel information for at least one pairing of at least one of said signal sources and said signal detectors and received samples of at least two of said signal detectors and supplies as an output a signal that includes at least said joint equalizer

Art Unit: 2611

solution applied to a signal received by at least one of said signal detectors, with reasons stated in REMARKS, pages 3-4, of the Response filed on 5/11/07, wherein, in light of the specification of the instant application, page 1, lines 25-32 and page 5, lines 14-21, the joint equalizer solution is defined that the joint equalizer solution compensates not only for the impact of the channel on all of possible transmit antenna-receive antenna pairings of a plurality of transmit antennas associated with the plurality of signal sources and a plurality of receive antennas associated with the plurality of signal detectors, but also for the interference of the other transmit antennas on any given receive antenna wherein the joint equalizer solution provides M, i.e., the number of transmit antennas, streams of correct symbols, or in the case of the CDMA, streams of corrected chips which when properly combined form symbols. It would not have been obvious for one skilled in the art to implement Jalali et al in view of other prior art of record for leading such the implementation to the claimed invention.

-Regarding to independent claim 32, none of prior art of record teaches a receiver for use in a multiple-input multiple-output (MIMO) system in which a plurality of signal detectors receive signals transmitted by a plurality of signal sources, as claimed. Jalali et al teaches the claimed receiver except he at least fails to teach the receiver comprising a joint equalizer that develops a joint equalizer solution using channel information for at least one pairing of at least one of said signal sources and said signal detectors and received samples of at least two of said signal detectors and supplies as an output a signal that includes at least said joint equalizer solution applied to a signal received by at least one of said signal detectors, with reasons stated in REMARKS, pages 3-4, of the Response filed on 5/11/07, wherein, in light of the specification of the instant application, page 1, lines 25-32 and page 5, lines 14-21, the joint equalizer solution is

Art Unit: 2611

defined that the joint equalizer solution compensates not only for the impact of the channel on all of possible transmit antenna-receive antenna pairings of a plurality of transmit antennas associated with the plurality of signal sources and a plurality of receive antennas associated with the plurality of signal detectors, but also for the interference of the other transmit antennas on any given receive antenna wherein the joint equalizer solution provides M , i.e., the number of transmit antennas, streams of correct symbols, or in the case of the CDMA, streams of corrected chips which when properly combined form symbols. It would not have been obvious for one skilled in the art to implement Jalali et al in view of other prior art of record for leading such the implementation to the claimed invention.

-Regarding to independent claim 42, none of prior art of record teaches a receiver for use in a multiple-input multiple-output (MIMO) system in which a plurality of receive antennas receive signals transmitted by a plurality of transmit antennas, as claimed. Jalali et al teaches the claimed receiver except he at least fails to teach the receiver comprising means for developing a joint equalizer solution using channel information for at least one pairing of at least one of said transmit antennas and said receive antennas and said received samples of at least two of said receive antennas, said joint equalization solution being developed at least partly in a frequency domain, and supplying as an output a signal that includes at least said joint equalization solution applied to a signal received by at least one of said receive antennas, with reasons stated in REMARKS, pages 3-4, of the Response filed on 5/11/07, wherein, in light of the specification of the instant application, page 1, lines 25-32 and page 5, lines 14-21, the joint equalizer solution is defined that the joint equalizer solution compensates not only for the impact of the channel on all of possible transmit antenna-receive antenna pairings of a plurality of transmit antennas

Art Unit: 2611

associated with the plurality of signal sources and a plurality of receive antennas associated with the plurality of signal detectors, but also for the interference of the other transmit antennas on any given receive antenna wherein the joint equalizer solution provides M , i.e., the number of transmit antennas, streams of correct symbols, or in the case of the CDMA, streams of corrected chips which when properly combined form symbols. It would not have been obvious for one skilled in the art to implement Jalali et al in view of other prior art of record for leading such the implementation to the claimed invention.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuong Phu whose telephone number is 571-272-3009. The examiner can normally be reached on M-F (8:00 AM - 4:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2611

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Phuong Phu
Phuong Phu
07/17/07

**PHUONG PHU
PRIMARY EXAMINER**

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Art Unit 2611